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EDITORIAL.

The arrival and passing of the Graduation Banquet for the final year makes us keenly aware of the fact that we are rapidly approaching the end of the year, which means the end of the course for many of us and examinations for all of us. About this time of year we notice our friends digging out back numbers of the Journal and marking off those articles they wish to re-read in preparation for their exams. It is our hope that this year's volume will have proved useful, to some extent, for this purpose. This particular number may not contain very much information that will be particularly valuable at examination time, but we feel that these articles should prove to be much more valuable in the long run. Dr. Goldsmith's article, which will be continued next month, is extremely practical and the articles by Drs. Marrian and Armour contain much food for thought. We are fortunate also in being able to reproduce the Hon. Dr. Bruce's address to the Medical Society, which was greatly appreciated by all who heard it. With the wealth of excellent material coming into our hands from both students and members of the staff, we hope to round off this volume with two numbers that should be full of meat. These numbers should include articles covering such a variety of subjects as Cough, Burns, Vomiting in Infants, Ringworm, Fractures of the Femur, Intestinal Obstruction, Surgery of the Prostate, Traumatic Neurosis and Plastic Surgery.

OBITUARY

WILLIAM JOHN HENDRY, B.A., M.D.

THE sudden death of Dr. W. J. Hendry came as a most extreme shock to his many friends in Toronto. "Jack", as he was familiarly known, passed away on February 18, 1934, following a very brief illness which was characterized by a rapidly-progressing paralysis.

His career in Medicine was already noteworthy. Throughout his medical course he won the admiration and esteem of all as a thorough scholar. In recognition of his ability he was awarded many scholarships throughout the course in Biological and Medical Sciences and in the Faculty of Medicine, which he pursued before entering the Medical course. Among these were: Alexander T. Fulton Scholarship, War Memorial Scholarship and several scholarships in Psychiatry.

Upon graduation he was awarded the Gold Medal of the Faculty of Medicine and the Ellen Mickle Fellowship, which entitled him to carry on a year's research work. It was during this year of research work in which he met his death. He was engaged in work in the field of Gynaecology and Obstetrics, concentrating his efforts chiefly upon the relation of the endocrine secretions to reproduction.

That Jack was not, entirely, one-sided in his ability is attested to by the fact that he was engaged in many and various extra-curricular activities. He was a member of Alpha Omega Alpha Honorary Medical Fraternity—being Secretary-Treasurer in his last year. He was Associate Editor of the University of Toronto Medical Journal; he was a member of the Library Committee of Hart House; he was active in the Sunday School of Eaton Memorial Church, and he was a member of the Delta Upsilon Fraternity.

Above all else, Jack exhibited high qualities of character and ideals. By both staff and student body he was admired and respected as a man as well as a student. There is no one but doubts that a future of the highest promise was cut off by his death. To those who knew him intimately and to those of but passing acquaintance, Jack revealed a sincere and genuine friendship, the quality of which is even more keenly appreciated by its absence.

The sincere sympathy of his many friends in the Faculty of Medicine is expressed to his father, Prof. W. B. Hendry, Professor of Obstetrics and Gynaecology, and to the other members of his family.

R. B. Kerr, B.A., M.D.

THE MEDICAL TREATMEMT OF DISEASES OF THE NOSE, THROAT AND EAR

PERRY G. GOLDSMITH C.B.E., M.D.C.M., F.R.C.S. (CAN.),
Professor, Oto-Laryngology, University of Toronto, Chief Surgeon of Oto-Laryngology, Toronto General Hospital.

A paper dealing with the non-surgical treatment of a class of ailments fashion has decreed shall largely be the drift of the zealous surgeon, the happy hunting ground of the embryo Oto-Laryngologist, may have in it some features that offer to our patients relief from their discomforts without resource to harsher measures.

Hamlet says: "It is better to bear the ills we have than to fly to others we know not of."

I do not wish to belittle in any way the marvelous help surgery has given our specialty, or its influence in placing Oto-Laryngology on a firm foundation.

But surgery, i.e., the mechanical part of the art that enters largely in its spectacular picture, suffers not from too little, but from too much attention. Sydenham wrote 250 years ago that "true practice consists in the observations of nature," and it has been aptly said, "the successful surgeon should be an optimist, but rose coloured spectacles should not be included in his gifts."

Many years ago while working in London with Dundas Grant, now Sir James Grant, he was wont to impress upon me, that it was more creditable to cure a patient by medical measures than by the most brilliantly conceived operative procedures.

One could hardly expect to hear such dogma now, but it was a good creed then, and to some, nay many, it would form a text they might well frame on their surgery walls. Anyhow, it was in such an atmosphere I absorbed my early training, and maybe this permits me wtihout egotism to offer the following:

I will endeavour to give you the details of my own practice rather than attempt to outline or particularize all the therapeutic measures we have at our disposal. This will probably mean a very elementary essay, still I hope it may bring our many favourite non-surgical measures that have served faithfully over years of practice. "From a long array of cases we can gain knowledge that a single case can never disclose." The years teach us much that the day never discloses." "When those who are responsible for much of our modern medical and surgical literature will act on this truth less ink will be spilled and more truth told."

Nasal Vestibule: The most frequent disease present in this area—the septic area of the nose, are the so-called vestibular eczemas, furunculosis and lupus —the structural abnormalities being septal dislocation, and alar colilapse. The acute inflammatory conditions are treated largely on the line of similar conditions elsewhere in the body. When a small abscess forms it is usual to find a hair in the centre, and removal of this will likely clear up the case at once. A furuncle just within the nasal vestibule is not a trivial disorder. The pain is not only severe, but may radiate on the entire head. I have seen it simulate a severe frontal sinusitis. The temptation to incise the pointing area is very great, but it is also very dangerous. The venous connection of the nasal vestibule, and the cavernous is so close that cavernous sinus thrombosis and death had often followed a simple incision of a small boil just inside the nose. Very great gentleness will well reward one in examining these

cases, for they are very sensitive. The continued use of moist heat and codeia will assist localization of the septic area and relieve the severe pain always present. A simple Carbolic and Boric Acid ointment applied to the hairs in the nasal vestibule is also of value. When a white spot appears and a hair cannot be pulled out the cover of the apex of the pointing area may be lifted off or opened with a sterile needle. Nothing should be done to break down natures leucocytic protective area. Squeezing the tissues to hurry up the removal of the septic focus is very painful, and not without danger. To prevent recurrence, for boils have a tendency to become at times, multiple, the use of ung. hydr. nitratis 2 drams, in oil of sweet almonds 1 ounce will be found very beneficial, the mixture being gently rubbed into the entire vestibule. White precipitate ointment 2-4 % is another favourite that has stood the test of time. A very good spray for crustings just without the nose is nitrate of mercury ointment grs. 40, olive oil drams ss., Liq. Paraffine ad 1 ounce. The use of a water spray containng a solution of Pepsin to remove nasal crusts is recommended by H. M. Jay in the Medical Journal of Australia of August last.

When the vestibular irritation is of the acute eczematous type non-irritating applications are of value, such as Liq. Carbonis detergens 1 to 4 parts of water, or calamine lotion made up with lime water. The chronic type with the formation of fissures is sometimes very annoying and intractable. Here one may find the use of very weak chromic acid, silver nitrate or trichloracetic acid of more value. The actual cautery may even be required. It must not be forgotten, too, that chronicity may be kept up by those who work in very irritating dust, as copper miners, or in those whose nasal secretions are very septic or otherwise irritating, and measures directed to alleviate such conditions should be sought.

Collapse may be redressed in the young, by nasal breathing, exercises to cause the dilator muscle to act regularly and thereby become stronger, or some simple dilating contrivance may be used at nights in the case of adults who do not desire any plastic operations.

Septal ulcerations about Little's area (incorrectly called Kesselbach's) generally respond to one of the various cauterizing agents, such as silver nitrate, trichloracetic acid or the actual cautery. Small bleeding areas on the cartilaginous septum require similar treatment, but one must remember that epistaxis is not always associated with ulceration, and persistent and recurring nose bleed demands the exclusion of such diseases as hyperpiesia, chronic kidney or liver diseases, uncompensated heart disease, mediastinal pressure tumors, the various blood dyscrasias, even typhoid with nasal ulcer, or the advent of some of the acute infectious diseases as the exanthemata or of pneumonia. An ulcer, however, with raised edges situated well back in the nose should give rise to the suspicion of syphilis and treated accordingly. When we have a chronic ulceration at the junction of the skin and mucous membrane, and lupus is diagnosed, the use of Carbon Dioxide snow, Acid Nitrate of mercury, or Trichloracetic acid is advised

The treatment of intranasal conditions has to do in the main with alteration in the nasal mucosa. Here we have a delicate sensitive tissue, aptly termed by some the inner skin, covered with a thin layer of ciliated epithelial cells. This lining is richly supplied with blood vessels, nerves and in some areas are found many glands whose secretion is poured out on the nasal mucosa. Just as our outer skin depends so largely on our general health, so does the inner skin show marked alterations when subjected to various irritations either external or internal in their origin. This is shown very well in the experiments of Meukie, who found that cold air blown on

the soles of the feet causes an immediate alteration in the nasal mucosa. Oedema, then of varying amount, oedematosis, a word by Baum, is the basis of most of the chronic conditions within the nose.

Structural alterations, such as a deflected septum and a straight septum, Fraser speaks of as being abnormally normal, may well form the foreground of our picture, but the real cause of *obstruction* and symptoms may be due to vascular changes—turgesence—or oedema of the mucosa. The picture of the amount of septal deviation is often considerably altered after thorough shrinking of the mucosa, and I suppose you all have been a little surprised to see really how small the septal deviation is after the preoperative packing has been removed. There is in reality a thickening of the septal covering sufficient to cause the discomfort of nasal insufficiency, or the results from impaired nasal irritation of drainage. So too may the same conditions exist in the covering of the turbinated bodies, but there is superadded a vascular element more extensive owing to the presence of large blood spaces or channels. The change of mucous membrane is in its acute phase largely due to what we call infections such as acute head colds, or the influenza and we speak of it as acute rhinitis.

There is no surgical treatment of acute rhinitis; medical men depend, I think, largely on measures directed to relief of the common head cold. My own practice is to give Quinine and Dover's powder, large doses of Aspirin with Bicarbonate of Soda, and frequently I order a mixture containing dram doses of Liq. Ammon Acetatis with half the amount of Spirit Ether Nitrosi, Hot Lemonade, Ginger Tea and the old fashioned hot Toddy are remedies that have served our Grandparents well, but we are in danger of forgetting their efficiency.

Local treatment should be, I think, just enough to lessen the main discomfort for it is a self-limited disease, and if no complications ensue, will rapidly get well. The French say, "A cold treated by drugs, etc., lasts a fortnight, if left alone gets well in 14 days." Inhalations of Menthol and Tinct. of Tolu in steaming hot water or the use of mentholated steam with or without Eucalyptus are pleasant at any rate. Friar's Balsam is the stock drug used in the Inhalations, but, Professor Rudolf points out that the aloes which enters its combinations is very irritating and the mixture is not nearly as soothing as the inhalations made with Tinct. Tolu. The use of compressed air spray is unwise in this condition. The exudation of mucous on the nasal membrane is nature's protection and if not excessive should be left alone or blown out in nature's own fashion. When it is desired to clear it away and this is very grateful to the patient, there is nothing in my mind equal to the old-fashioned Higgonson's enema syringe, using a soft rubber tip. The solution should be bland such as 2% solution of soda, normal saline or weak boracic acid solution, injected in one nostril and with the head forward it comes out the other side if the patient breathes through the mouth. The use of 5-10 min. of comp. tincture of Tolu, adds, I think, to the efficiency of the mixture. Care in blowing the nose and exposure afterwards is essential. If an oil spray is used subsequently, and all noses seem to require oiling, the amount of menthol should be very weak for it is an irritant and a stimulant, though possibly a little anaesthetic in action. Argyrol is often used as a spray in the subsiding stages of acute rhinitis. I think it has some virtue. When a nasal spray is used it tears off areas of mucosa and frequently we see little red spots, possibly a little bleeding, surely not a desirable method of procedure in acute inflammatory conditions of the nasal mucosa. The Ophthalmic surgeon does not so treat an acute conjunctivitis of simple origin. The use of Argyrol packs in the middle meatal region of the nose

for acute inflammatory conditions associated with acute rhinitis has many advocates. I have given it up. Any packing in the nose will produce the very symptoms we are trying to relieve, but we are dealing with a general condition with local manifestations of unknown infection in the nose, and spreading so often to the pharynx, larynx, and trachea, before getting well of itself. With the subsidence of the acute condition the mucosa secretion becomes more tenacious and areas of crusting may form especially if rough spraying treatment has been used. Here the use of non-stimulating lotions are desirable, such a one might be used:—

> Bicarbonate of Sodium—grs. 5; Borax—grs. 5; Acid Carbolic—grs. 5; White Sugar—grs. 5; Water to 1 ounce.

Repeated attacks of acute rhinitis lead very often to a chronic form of rhinitis with or without over growth of tissue. One form is that known as rhinitis sicca, a variety of dry rhinitis to be distinguished from what is known as atrophic rhinitis by the fact that the crustings which occur in both forms have in the sicca type no odor and the turbinates are full and rounded rather than atrophic. The treatment of this type depends on which form the disease takes. There are the plethoric and anemic varieties. The former occurs frequently in people with gouty tendencies, especially if they are alcoholic or dyspeptic and in people of a full habit of body, especially if they indulge their appetites too freely. The condition reflects more credit on the skill of the cook than the alimentary austerity of the diner. Local treatment is over done in these cases, and too much attention is paid to the nose and too little to the digestive tract. The man who habitually over eats and bolts his food, takes little exercise or none, smokes and drinks too much, needs advice as to his method of living rather than a series of office treatments, consisting largely of puffing of perfumed oils into the upper respiratory tree. He would be better by far if in addition to correction of his living faults, he took such a mixture as the following:—

> Tincture Nux. Vom.—½oz.; Sodi. Bicarb.—120 grs.; Syr. Rhei. Aromat.—2 oz.; Inf. Gentian Co. add to 6 oz. Two teaspoonsfuls before meals.

Those who are millers, stokers, boiler makers and engine-room workers are commonly affected. Nasal stuffiness, crustings and in spite of the general dryness of the mucosa, profuse watery discharge is excited by changes in temperature or exposure to cold winds.

The treatment is both general and local. Attention to diet, exercise and free bowel evacuations are essential. Alcohol and tobacco should only be used in great moderation, outdoor exercise and turkish baths are of value also. Locally, gentle stimulation of the mucous membrane and the prevention of crusts, especially on the septum, where they tend to cause perforation, are the chief indications. The best local stimulants are Sodium Chloride and Potassium Chlorate, five grains of each might be added to any simple alkaline lotion. Crusting may be lessened by various oily sprays, or better, by ointments containing Acid Boric, Bismuth Subnit and Zinc Oxide. Mucine is fancied very much by Stuart Low, and I sometimes employ it in combination with a small quantity of menthol.

The anemic type shows pallor of the mucosa, arrest of secretions and tendency to form small crusts. It is common in females while the plethoric is more often found in males. Perforation of the septum is not uncommon. The general treatment is similar to the plethoric type having regard to the type of patient, care and attention to the general health with the administration of iron, arsenic and Cod Liver Oil. Locally the treatment is the same as for the plethoric type. The discomfort in this disease, I feel sure, in so far as

dryness is concerned, is directly related to our methods of heating our houses. We have them far too warm and far too dry; the air going to our lungs being too dry in the first place and not getting sufficient physiological moisture in such nostrils passes into the respiratory tree in a state nature does not accept without protest which we see in the varying pathological state of the respiratory mucosa. There is much to command the placing of receptacles containing water in various places in our houses, so that the air is made more moist and the discomforts from excessive dryness alleviated.

Chronic rhinitis with overgrowth especially along the inferior turbinate body is one of our most common disorders. Granted it is a change in the nasal mucosa with permanent dilation of the underlying blood spaces associated with patients who have had over a considerable period of time, various types of acute rhinitis, there still remains the fact that the process is essentially one of altered general metabolism. We are taught that if the mucosa shrinks under cocaine, there is no hypertrophy and the case is not one of hypertrophic rhinitis. This is true so far as the development of a large amount of fibrous tissue is concerned, but long before the dense overgrowth and irregular contractions take place, the patient experiences all the discomforts of the fully-matured changes. Periodical alternating nasal obstruction due to the instability of the vasoconstrictor mechanism of vessel spaces in the early stages of hypertrophic rhinitis, may be relieved by careful regulation of the patient's habits, diet, exercises and excretions. Regulation of the heating and ventilation of the sleeping apartments is important. Even the feather pillow on which the patient lies is a matter of great importance. Local treatment is the least concern, washes to the nasal mucosa, perfumed oil sprayed into the nose makes him feel better and gives those who like it an opportunity for office treatment. Occasionally a little silver 20% applied along the lower scroll of the turbinate stimulates it to contract better. I like to give my patients the following application, used, if you wish, in an atomizer:—

> Sodi. bibor.—5 grs.; Zinc Sulph. —½ gr.; Hazaline (B.&W. Witch Hazel)—30 mins.; Water add to 1 oz.

A Glass Nose Boat for a patient's own use is also very suitable. Using a powder made up as follows:—

> Fruit Sugar—2 teaspoons; Salt (cooking)—1 teaspoon; Soda (baking)—1 teaspoon.

Add half a teaspoon of the above mixture to 1 cup of luke-warm water, to be used in Nose Boat as directed.

Dense obstructing overgrowth, especially at the posterior ends of the turbinate, require surgical measures. Have a care, however, how you sacrifice turbinate tissue for discomfort that may and ought to respond to general systematic therapeutics. The electric cautery I only use occasionally.

Recently a patient of mine whose nose came within what might be called normal limits, went to England. Those of you who have gone there in the winter time will probably not be surprised to know that her nasal mucosa underwent a marked change, turgesence being the main feature. She was of a nervous type and was induced to see specialists. One advocated an antrum operation to relieve the discharge from an oedematous nucosa, another thremoval of her posterior tip enlargement, while another still suggested the removal of her tonsils. I said to myself, "so this is London". How different in my time. On returning to Canadian climate and to the simple life we Canadians try to live, she rapidly improved —but she still has her tonsils—for how long—I wonder.

Atrophic rhinitis, with or without foetor, is familiar to you all, and until recently has been treated by topical

applications and douches. I have used them all. Glucose and glycerine seem as good as any, maybe a little better, depending on the efficacy of its application by the patient himself. I always advise my patients to make up their minds to perform a nasal toilet once or twice a day for years to come. I do not have them come for office treatment, but only see them occasionally. There may be some hope from surgical measures directed to narrowing the nasal passages, but I have had no experience of this.

That form of chronic oedematous rhinitis associated with a pale, boggy mucosa, and a free flow of watery fluid occurring mostly in neurotic females, is familiar to you all. Most of these patients when sensitized show nothing to account for the condition. Local treatment is useless, so too in the main, is the general treatment. My practice is to order some Liq. strychina and Atropine, hoping thereby to relieve some of the discomfort. Resource to surgery is usually a sad disappointment. Over a period of years many get better, some become well with a fairly normal mucosa, why, I do not know. Recently a salt-free diet is advocated as giving helpful results.

Acute and Chronic Sinus Inflammation.

The accessory nasal sinuses have suffered much from indiscrimination and over-zealous surgery, probably no area of mucous membrane has suffered as much. In the beginning of all inflammations of the mucous membrane serous exudation takes place from the mucosa mixed with mucus in varying proportion, depending on the number of glands excited. The mucin and almumen present accounts for the gelatinous character of the fluid. The exudation is Nature's protection, and Yates has shown that the severity of a sinus infection depends upon the power of the mucosa to prevent its destruction by the micro-organisms, and if the property that mucus possesses of preventing the passage of water and hence of water soluble toxins is destroyed, that a progressively increasing poisoning by these toxins of the ciliated epithelium occurs. As the ciliary paralysis increases, the secretion of mucus is also paralyzed until finally the micro-organisms come to dwell in a symbiotic state in the sinus and the toxins from them are readily absorbed, with the possible production of remote symptoms.

When in an acute sinus inflammation there is free discharge and no severe pain or very marked systemic disturbance, it is obvious that the best treatment is to see that the cilia of these cavities are able to wave the mucus or muco-purulent material away, and preserve, by general supportive measures, the well-being of the patient, so as to lessen the liability to the cilia to be overcome by the toxic products of the infection for if this takes place, chronicity of the inflammation with a purulent type is a strong probability. The general intranasal congestion and oedema may be lessened by the following measures:

1. Confinement to an even temperature, in bed, if possible.
2. Free evacuation of the bowels.
3. Diaphoretic mixture administered at intervals.
4. Hot fomentations to the face and forehead.
5. Cleansing the nose with a nasal douche, using only a bland alkaline solution. Wingrave says, "a 2% solution of sodium sulphate dissolves the mucus and globulins of which the secretion largely consists, better than anything else, while the addition of a 2% sol. carbonate of soda assists in breaking up the envelope of the pus cells."
6. Frequent blowing of the nose or hawking the secretion back into the throat, not only mechanically removes the secretion in the nose, but helps to draw it out of the ostium.
7. Suction may be used to remove

the nasal secretion and to draw the exudation from the air cell. Occasionally one may be able to remove several drams from the antrum and rapidly cause resolution. It does not seem to act equally well in all cases. Posture of the head has a great influence in the success of suction. On the whole, suction is disappointing and at times very painful.

8. Measures directed to shrinking the nasal mucosa about the ostium, such as cocaine and adrenalin, act well in some cases, ephedrine prolongs the shrinking time, but in others the reactionary swelling makes matters worse than before the use of thes remedies. It should be remembered that all acute sinus infections tend to get well themselves. If retention with pain, etc., ensues, further measures may be required. Measures already advised for the treatment of acute rhinitis have here an important place. Some laryngologists never irrigate an acute maxillary sinusitis. I am sure some of their patients suffer unduly.

Irrigation through the natural channel area to the maxillary antrum may succeed, and I often find it very satisfactory. Puncture through the inferior meatus with lavage, using a small trochar, preferably a straight one like Tilleys, is easily carried out, and if the local anaesthetic has been correctly applied, almost painless. Failure to get any return flow even after altering the depth of the cannula, suggests the use of a second trochar so as to provide an exit for the return flow until the swelling has subsided. Too frequently repeated washings are harmful and disinfections are of little value. When the character of the secretion removed is like a semitransparent mucoid blob, the patient is better left alone as the cilia will then rapidly clear this away in nature's own fashion, while puncture and irrigations are then irritating. Logan Turner speaks highly of the electric head bath in acute sinus involvement. I have no experience with it.

When the brunt of the inflammation is in the frontal sinus, attempts to probe or irrigate the frontal nasal channel are likely to do more harm than good. If one can only do this in, say, 30% of the cases, when no inflammation is present, how much more difficult and harmful must it be when this tortuous channel is the seat of acute inflammatory oedema. Chronic sinus involvement has little to expect from medical measures, but this does not necessarily mean that all cases require surgery. When a sinus is well ventilated, its mucosa is not always productive of so much discomfort, that severe surgical measures are essential, for no surgical procedure can restore that mucosa to its normal condition when once profound oedematous overgrowth has taken place. But if this membrane is removed McGregor has shown that there is a complete reformation of the epithelium including cilia and glands. I have come to view many of the chronic hyperplastic changes in the lining of the air cells as being related to an oedematous diathesis. The same pathological change takes place in the gall-bladder in chronic cholecystitis and in the bowel as chronic colitis.

Patients who complain of discomforts associated with increase in bulk of their nasal accessory sinus mucosa, with or without increase secretory activity, should be investigated from the viewpoint of allergy. Infection may be present, but the allergic reaction in the individual may have prepared a soil suitable for septic reaction. The frequency with which allergic manifestations are associated with airborn irritants such as pollen, feathers, dust, and etc., as is seen in Hay-fever and Asthma, has stimulated results in many conditions when some specific reaction appears to be present, viz.,

migrain, so-call eczema, and various drug eruptions.

The food we eat next to air-born irritants come probably first as a causative agent. Tests to find the specific diet are not infallible, and an elimination diet is tedious and annoying. This is where the food fadist comes in with all sorts of new fashionable diets. These soon become commercialized and the deluded sufferers again experience another "racket".

When we look upon chronic inflammatory disease of the nose as having in all probability an allergic background, less meddlesome surgical tinkering will be carried out on the basal accessory sinuses.

CORONARY THROMBOSIS (Part II)

R. W. GRAHAM, M.D.,
Toronto General Hospital.

Myocardial Infarction.—

1. *Macroscopically.*—The most striking and characteristic lesion in the heart is the localized area of damaged heart muscle, the infarction. During the first day the infarct is deep red in color, due to the extravasation of the blood into that area. There is as well, some necrosis of muscle fibres. The extravasated blood remains for some days, but is most marked during the first three or four days. The necrosis of the muscle fibres begins right after occlusion, but is the most marked feature from the fourth to twenty-first day. There is some degree of liquefaction, during this period, in the infarcted area. In the gross, the area of infarction is demarcated from the normal muscle in colour and consistency. The colour varies from reddish-purple to deep red, and the consistency of the infarcted area is much softer than that of the uninvolved tissue, and this varies with the degree of necrosis.

Repair by connective tissue proliferation begins as early as the 6th or 7th day, but connective tissue replacement of the damaged muscle is not a marked feature till after twenty-one days.

It requires more than 5 weeks for firm cicatrization to develop, so that rupture will not occur. Rupture is most likely to occur any time between the fifth and fifteenth day, during the period in which necrosis is most marked. Most ruptures occur through an aneurysmal dilatation. Firm vascularized scar tissue has been observed in the involved area, eight weeks after the attack. This is an important factor to know, as it is of value in the treatment of the condition. The scarred area contracts down so that finally the scar is much smaller than the original area of infarction. Also the ventricular wall is much thinner at this site. The scar is reddish-gray or gray, but becomes firm and white as it loses its cellular elements.

2. *Microscopically.* — The infarcted area shows within a few hours, the presence of oedema and haemorrhage. Shortly after this, necrosis of muscle fibres is observed, and leucocytes make their appearance. Necrosis, liquefaction, and leucocytic infiltration may be so marked as to give the appearance of abscess information. This process goes on for the first few days, and may even be present to a minor degree for a few weeks. Connective tissue formation makes its appearance early, being more marked in the centre of the necrotic area and less marked around the edges. This repair by connective tissue proliferation goes along quite rapidly. In the central zone, connective tissue proliferation is going on, just beyond, an area of necrosis and haemorrhage. The muscle fibres at the edge of the infarcted area are involved, as well as

those within the infarcted area, in the process and show fatty degeneration. This is due to the interference with nutrition, and occurs before the complete blockage. Evidence of this is shown in the recent infarct, by the presence of small scars. The presence of a single large scar in a portion of recent infarction, suggests recurrence or extension of the process within the same vascular distribution. Whereas the presence of numerous small scars suggests the presence of diffuse coronary sclerosis, or else they are part of a general process of chronic interstitial myocarditis. In chronic interstitial myocarditis, the muscle fibres atrophy as a result of impaired nutrition due to a narrowing of the coronary arteries, and are replaced by connective tissue formation. The muscle fibres beneath the endocardium and about the blood vessels, where the nutritive supply is most abundant, are often not atrophied. If in a recent infarction, chronic changes are seen beside the acute process, then one can conclude that the injury was gradual, or intermittent in character.

Complications.

1. *Involvement of pericardium and endocardium.*—If the infarction of the cardiac wall is extensive enough, then the pericardium or endocardium is involved as well. The evidence that pericardium has been involved is the presence of pericarditis over that area, and in the case of the endocardium the presence of a mural thrombus.

Mural thrombosis is quite frequent and provides a source of embolism. The thrombus that results from the infarction is attached directly to the area of damaged muscle and endocardium. The most frequent organs for emboli to lodge in, after breaking loose from the mural thrombus, are the brain, kidneys, spleen and lungs. In those organs infarcts result, and give rise to clinical manifestations, such as hemiplegia, haematuria, pain in the region of the spleen, and haemoptysis. Emboli passing to the lungs come from the septum which may be involved in thrombosis of either right or left coronary arteries.

Pericarditis is usually a sterile process, and more of a fibrinous character than serous.

2. *Aneurysm.*—The infarcted area is repaired by connective tissue replacing the damaged muscle. This area of scar tissue may be of such a size and strength as not to be able to withstand the pressure of blood from within. The scarred area gradually becomes thinned out and bulges outward, in the form of an aneurysm of the wall of the heart. As the sac increases in size, the wall of the aneurysm becomes thinner. The wall of the aneurysm is composed of endocardium, fibrous tissue, visceral pericardium and sometimes adherent parietal pericardium. The aneurysm may be a circumscribed sac communicating with the heart cavity by a small opening, or may be a simple dilatation of part of the ventricle. The sac may be filled with fluid blood, but usually mural thrombosis occurs. The wall of the sac may become calcified or rupture giving rise to a haemopericardium and death.

3. *Rupture.*—Rupture of the heart as a complication is not very common.

4. *Congestive Heart Failure.*—Congestive heart failure may be associated with myocardial infarction. Myocardial insufficiency following infarction may be so severe as to give rise to heart failure. This occurred in 3 cases out of 46 of Levine's and 62 cases out of 83 of Parkinson & Bedford's.

Infarction may occur in the course of congestive failure due to some other condition. This condition was present in 5 of 46 cases.

5. *Enlargement of the Heart.*—In cardiac disease of a chronic nature there is always some degree of enlargement; but in the case of coronary thrombosis, which is acute in its onset, yet nevertheless develops on a chronic process, there is found to be some enlargement of the heart.

Pathological Findings Outside the Heart.—The lungs show oedema, or

congestion, or both. Chronic passive congestion of the viscera is common. Liver and spleen are congested and enlarged. Kidneys show congestion, and often lesions of vascular nature, such as renal arteriosclerosis, and chronic vascular nephritis. Infarcts of organs such as kidney, spleen, brain and lung, are commonly found. Occasionally lesions in gall-bladder and pancreas are present.

Etiology.—Thrombosis is the agglutination of a mass of platelets, glued together with fibrin, and including the leucocytes and red cells. This process goes on in a flowing stream, and there is therefore, either a change in the vessel wall or in the blood itself. In coronary thrombosis, there is always an antecedent vascular disease, which is a coronary endarteritis with atheroma. Coronary sclerosis in itself is a sufficient cause for thrombosis, apart from slowing of the stream or increased number of platelets, which are secondary. Therefore, the etiological factors for coronary thrombosis are the same as those for coronary sclerosis.

Relation of Coronary Thrombosis to Coronary Sclerosis.—Of a series of 44 cases of coronary disease examined at autopsy during the past four years, 18 showed a thrombus lodged in a coronary artery and the other 26 cases showed advanced sclerosis to a degree sufficiently marked to be classified as coronary sclerosis. Comparison of the pathological and clinical features of thrombosis and sclerosis show a marked correlation between the two.

Relation to Angina Pectoris.—Coronary thrombosis is closely related to angina pectoris, which is always due to interference with the blood supply of the heart. Commonest cause of the diminished blood supply is coronary sclerosis. Many cases of patients suffering from angina pectoris end up with an attack of coronary thrombosis, which may or may not be fatal.

Hypertension and Arteriosclerosis.—A previously existing hypertension is probably the most common single etiological factor in the development of coronary thrombosis. In Levine's 145 cases, 58, and in Boas and Doner's 170 cases, 71 had hypertension.

Coronary sclerosis occurs not uncommonly in those with hypertension, but one cannot say that it is the result of hypertension, since many cases of persistent high blood pressure have no arteriosclerosis. The opposite is also true, that hypertension is not the result of coronary sclerosis. The sclerosis associated with hypertension is a medial one, whereas, that occurring in the coronary vessels is an intimal one.

These coronary scleroses make their appearance independent of scleroses in other parts of the body, and therefore the presence of sclerosis in the radial arteries gives one no idea as to the presence, or absence of sclerosis in the coronary vessels.

Age.—The age at which the attack occurs is usually somewhere between 50 and 70 years, rare under 40. The youngest case that I have heard mentioned is that of a child 14 years old, who, prior to the attack, had suffered from three infectious diseases within a very short time. At autopsy, there was evident sclerosis of the coronary arteries, with a thrombus in one of the branches .

Sex.—There is an incidence of 3 males to 1 female.

Occupation.—Angina is more common among business and professioal men, but coronary thrombosis is not limited to those engaged in particular occupations. Angina is a disease "occuring in people who work with their brains at high pressure".

Relation to Effort. — Coronary Thrombosis has less causal connection with bodily exertion than angina. Many attacks, it is true, follow exercise of a severe kind, emotion, or a large meal—the latter coincidence being the origin of the popular diagnosis, "acute indigestion". More deaths oc-

curing during sleep are due to this condition than are recognized.

Clinical Features.

Symptoms and Signs of Coronary Thrombosis.—The symptoms at the onset have a great variation in severity, and range from those that end in immediate death, to those that are so mild as to cause the individual no discomfort whatever, and therefore in that case, the physician is not consulted.

Three Main Clinical Groups.—The most severe clinical group and smallest are those who drop dead independent of exertion, or collapse, become unconscious and die in a few minutes. A few cases have pain at the lower end of the sternum, or in the epigastrium, vomit a few times and die in a short time. These cases were formerly wrongly diagnosed as cases of "acute indigestion".

The largest group in which diagnosis is properly made includes the so-called typical clinical picture with characteristic onset. These cases develop a sudden severe persistent pain in the chest, accompanied by shock, vomiting, collapse, cyanosis or pallor, feeble rapid pulse and are frequently followed by signs of circulatory failure, such as oedma of lungs, or a rapid enlargement of liver.

The largest group of all consists of the mild cases in which the diagnosis is frequently overlooked, or difficult. Some cases have pain in short or long attacks, others have no pain at all. There may be an attack of dizziness or faintness accompanied by nausea, vomiting or discomfort in the chest. The diagnosis of coronary thrombosis should be suspected, whenever certain changes referable to the heart produce a sudden alteration in the condition of the patient, such as a sudden decrease in exercise tolerance, due to pain, dyspnoea, or paplitation.

The Typical Clinical Picture.

History.—The patient has had previous history of angina pectoris, that antedated the attack of coronary thrombosis by months or years. There are, of course, many cases of coronary thrombosis that occur without a history of previous heart disease.

Onset. — The attack of coronary thrombosis, unlike that of angina, often is not precipitated by effort, frequently occuring while the individual is sitting at a dinner table, or sleeping. In Parkinson & Bedford's 100 cases, in 33 cases the pain began during sleep, and in another 26 it occurred without exertion. If he has had previous anginal attacks, he is aware that this is much severer than anything he has previously had

With the onset of the attack, the patient is stricken with a severe, persistent, constriction type of pain, which is present generally in the chest, in the precordial region, or at the lower end of the sternum, and, not infrequently, in the epigastrium. The pain may radiate to the neck, shoulder, back and arms, more often down the inner side of the left arm. This pain is not relieved by amyl nitrite, and is very little affected by morphia. With the pain, severe dyspnoea may occur, even Cheyne-Stokes breathing, and signs of shock and circulatory failure make their appearance. The patient is restless, contrasted with the marked rigid immobility seen in angina pectoris. The expression is anxious, and sweating is present. Nausea and vomiting frequently occur.

When one examines the patient he is impressed by the severity of symptoms, and by the fact that they seem out of proportion to the physical findings. A careful search, rewarded by finding enough points to enable one to recognize the true condition in the heart, is extremely important. The physical signs of the patient are of not much value in the early stage of the disease. The general appearance of the patient is worthy of mention. He has the appearance of one suffering from severe pain and apprehension, and shock. The facies are pinched,

ashen-gray or pale, and there may be a slight cyanosis of the lips. The skin is moist and cold, almost clammy. He is extremely restless, and it is impossible for him to remain quietly seated or in bed.

The temperature is subnormal. The pulse is weak, easily compressible, rapid, usually with normal rhythm. There is a fall in blood pressure which occurs shortly after the onset of the attack, and continues for several hours. Signs of heart failure may be present.

On examination of the heart, the apex beat cannot be seen or felt. The heart is moderately enlarged to percussion. The weakness of the heart action is indicated by weak, distant, scarcely-audible heart sounds. As the sounds are almost always muffled or distant, the quality is of great value. The first sound is faint or absent, while the second sound, at the apex, is distinct. The presence of a pericardial friction rub is pathognomonic of coronary thrombosis, appearing within a few hours, or a day or so after the abrupt onset of myocardial insufficiency. It is an evanescent, to and fro rub, and lasts only a few days. It is present in about 15 per cent. of cases, and so must be conscienciously sought for each day.

Oedema of the lungs may develop slowly or fairly rapidly, occasionally acute oedema develops. The presence of rales at one or both lung bases, (the more generalized the rales, the more severe the case) may be the first clue to a failing circulation.

The liver may become slightly enlarged from the congestion, and is tender to palpation. The upper abdomen may show the presence of some tenderness and rigidity.

The presence of oedema of the legs, free fluid in the chest or abdomen denotes evidence of generalized congestive heart failure, and alters the prognosis and treatment.

Course.—The duration of the severe pain is from half an hour to many days. Morphia is required, in most cases, to give relief. After recovery from the initial shock the temperature rises from 99° to 102° F. The slight fever starts after 36 hours, and lasts from one to ten days or longer. Only in mild cases, and then very rarely, is fever absent. Levine says that if there is no rise in mouth temperature there is a rise in rectal temperature 1 to 2 degrees in every case. Leucocytosis makes its appearance shortly after the start of the pain. The count is usually from 12,000 to 16,000, and lasts for several days. This sign is practically never absent.

Fever and leucocytosis in coronary thrombosis develop several hours after the onset of the attack and are, therefore, helpful in early diagnosis. They gradually disappear after several days, and the patient looks and feels well, yet the outlook may be grave, as complications may occur at any time.

Those cases that developed pulmonary oedema early show a marked improvement within a few days, although some develop a failing circulation as evidenced by oedema of legs, and enlarged liver.

The presence of a to and fro, pericardial friction rub must be conscienciously sought for, as it is pathognomonic of coronary thrombosis. It makes its appearance within a few hours, or a day or so after the abrupt onset of myocardial insufficiency, and lasts only for a few days. It is really a complication of the disease. Occasionally embolism is the first sign to suggest the disease, but more often it occurs after the first week as one of the complications of the disease. Rupture of the heart, another of the complications, may occur occasionally, usually some time between the fifth and fifteenth day, and results in sudden death.

The patient's general condition and appearance changes very little, and shows very little of importance, except as mentioned above. In an uncomplicated case, after the pain has disappeared, the patient remains weak, yet makes an uneventful recovery. The temperature and leucocytosis disap-

pear, the pulse slowly returns to normal, and the blood pressure may remain permanently low, or rise to a point somewhat nearer normal. Any type of irregularity of the heart that was present disappears, as well as rales of the lung bases and tenderness of the liver. The time for the apparently normal state to be resumed varies in different individuals, depending on the severity of the injury. It may vary from a few days to several weeks.

Death may occur at any time from the onset of the attack until a period of several weeks has elapsed, from a variety of causes.

Characteristic electrocardiographic changes are of value in the diagnosis of coronary thrombosis. The rapid successive series of changes occuring in the shape and direction of the T wave from day to day, is the most important diagnostic feature.

Types of Recovery.—Patients who recover from an attack of coronary thrombosis differ in their future health, as well as in their duration of life. There are, in general, three types of recovery that are fairly distinct.

1. One common type consists of those who, previous to their attack of coronary thrombosis, suffered from attacks of angina pectoris, but who are now free of such attacks. These cases are ambulatory, and represent the most favourable type of recovery, often being well and active from three to five years after their attack.

2. Another group are those cases in which angina pectoris is present after the attack of coronary thrombosis, whether or not it was present before. These cases, because of their attacks of angina, have to restrict their activities.

3. The other main group are those cases which develop evidences of circulatory insufficiency, to a greater or less degree, after the attack of coronary thrombosis. Signs of insufficient circulation may be present immediately after the attack and clear up, but when they are present some weeks after, then they are of real significance. Signs and symptoms present are usualy dyspnoea, oedema, enlarged liver and hydrothorax.

Modes of Death in Fatal Cases.

1. Sudden fibrillation of ventricles is the explanation offered for the cause of sudden death, in cases where insufficient pathological evidence is found at autopsy.

2. When patient survives longer, general failure of the circulation may result within one to several hours. The patient presents the picture of extreme shock and low blood pressure, and death may follow from the results of an enfeebled and insufficient circulation.

3. Death may occur from heart block due to involvement of the conducting apparatus.

4. The patient may feel perfectly well and death occur unexpectedly between fifth and tenth day from a rupture of the heart through the infarcted area.

5. Death from lodgement of emboli in important vessels. If emboli lodge in the cerebral vessels, hemiplegia, unconsciousness and impairment of higher centres and death, or from lodging of emboli in peripheral vessels with gangrene and additional burden on patient's vitality.

6. A group of patients recover from the immediate effects of coronary thrombosis, but develop a progressive circulatory failure of the congestive type. Death occurs in from one to three months.

7. A group of patients are able to carry on with limited activities for years. In this group of ambulatory patients, true aneurysms of the ventricles are found.

Prognosis.

The prognosis in individual cases of coronary thrombosis is very difficult to predict. There are no specific criteria, by which one can go, in order to pre-

dict the possible outcome. There are cases in which a severe attack occurs and the patient recovers; and on the other hand, there are cases in which a mild attack is fatal. Parkinson sums up the prognosis, saying "a patient seen alive has a fifty-fifty chance of surviving that attack". Of those seen alive after the beginning of the first attack, over 50 per cent. succumb within six months from ruptured heart, heart failure or subsequent attacks. A very few recover sufficiently to resume former activities. Most of those who survive the first few months have more or less marked cardiac disability, and may have typical Angina Pectoris for the remainder of their lives. So that, angina is a common sequel as well as common precursor of coronary thrombosis.

The prognosis varies with some conditions, but many conditions have little effect, and so their presence or absence makes little difference. Sex, age at which attack occurs, and presence of hypertension, arteriosclerosis, or syphilis alters the prognosis very little. The degree of collapse is helpful in estimating the prognosis. Poor heart sounds, and congestive heart failure add to the gravity of the prognosis.

The average duration of life after an attack of coronary thrombosis is from two to three years. Connor and Holt—records of 287 cases—average duration 2.1; and White's series of 200 cases average two to four years, White's series of 62 cases average two years.

Treatment.

In order to control the pain, morphia is given in doses of gr. ¼ and repeated every 20 to 30 minutes until the pain is relieved. In average cases no other medication is necessary.

In cases where collapse with disappearance of the pulse occurs, caffeine sodium benzoate gr. 7½ to 15 intravenously or strophanthin gr. 1-100 intravenously is given. For oedema of the lungs, dysponea and cyanosis, an oxygen tent is valuable. For acute oedema—atropine gr. 1-50 is given.

The diet should be fluid for the first few days and from then on should be gradually increased, but not to as much as normal. In severe cases, the patient should be fed for the first two weeks. Mild purgatives and enemata should be given until the danger of rupture is over.

Absolute rest in bed for eight weeks in average cases and longer in more severe cases. This is done so that no extra exertion will be placed on myocardium in its weakened condition and to allow the infarct to heal completely and form a firm, fibrous scar. Following this the patient should get out of bed for a short time each day until they are up 12 hours a day. Then for the next year they should be in bed 12 hours each day and should resume exercise gradually.

The onset of pain in one or both legs or feet should make one suspicious of embolism. A usual site is at the junction of the femoral and profunda arteries. If gangrene supervenes, the operation of embolectomy should be carried out immediately, since the sooner it is performed the easier and more successful it will be.

Summary.

1. It is hoped that in this paper the etiology, pathology, clinical features of diagnosis, prognosis and treatment have been clearly defined. The following is a short resume of the important features of the disease:

2. Organic heart disease ranks first among the ten chief causes of mortality. Of the organic heart diseases, coronary thrombosis is now recognized by physicians as an important cause of morbidity and mortality. It is a definite clinical entity having a characteristic pathological background. It is possible that this disease may be on the increase.

3. Angina pectoris generally precedes an attack of coronary thrombosis,

but there are many instances in which the patient not only had no angina, but also no important pre-existing disease. Hypertension is present in some cases, but it is not related to intimal sclerosis, which occurs in the coronary system, but to medial sclerosis. Diabetes may have some influence, because diabetics are more prone to arterial disease than nondiabetics. Infectious diseases are important, inasmuch as they are regarded as factors in the causation of coronary sclerosis, which always precedes coronary thrombosis. There are many cases that develop coronary thrombosis, that have a peculiar predisposition to intravascular clotting elsewhere in the body. There is no single clinical factor of any importance or constancy in the causation of coronary thrombosis. Average age, 55 to 60 years. Sex incidence of three males to one female.

4. The characteristic pathological lesion found in the heart, as a result of thrombosis of a coronary vessel, is myocardial infarction. This varies in size and distribution, usually occuring in the area of left ventricle supplied by the anterior descending branch of the left coronary artery. The reason for this is that the above-named artery is most commonly thrombosed.

The coronary vessel shows the presence of a thrombus, which occurs at an area of intimal sclerosis.

5. The clinical features of the disease are discussed. The typical attack of coronary thrombosis: the patient, usually a man 50 to 60 years of age, is suddenly stricken with a severe, persistent, precordial, retrosternal or epigastric pain, constricting in type, which may radiate up to the neck and down the left arm. This pain lasts over half an hour, up to two or three days, is not relieved by amyl nitrite, and only by repeated injection of morphia. The attack is usually not brought on by exertion, and the patient is extremely restless. Nausea and vomiting may occur, and sweating is usually present. Signs of shock and circulatory failure then make their appearance.

The type of recovery and modes of death are recorded.

6. Prognosis.—Generally a patient seen alive has a 50 per cent. chance of surviving that attack. The ultimate prognosis is poor. The average duration of life is two to three years.

7. Treatment.—During the attack, pain is relieved by morphia and stimulants given if the blood pressure falls very low. Then this is followed by rest in bed for eight weeks, without the slightest exertion. The diet is light, nourishing and easily assimilable.

8. Although this disease is not extremely common, it should be remembered and kept in mind both by physician and surgeon in the differential diagnosis. There are cases that have been mistaken for an "Acute Abdomen" and operated on with disastrous results.

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NUMBNESS, TINGLING AND DIZZINESS

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These three symptoms are among the commonest that one meets with in the early stages of a number of important nervous diseases, and I would suggest that their significance in general might be discussed briefly and that a few short histories of some abortive cases of particular significance be appended.

Hemiplegia, due to vascular disease or new growth, is frequently preceded by numbness or tingling, and less frequently by dizziness.

However, since the term dizziness is loosely used by many patients, I would prefer to signify by it the sensation either of the patient turning, or of objects about him turning.

With this limitation of meaning, one recognizes as causes of recurrent attacks of dizziness, acquired strabismus, acquired nystagmus, Labyrinthine disease, circulatory disturbances in the brain, including cerebral arterio-sclerosis and after effects of cerebral concussion, disseminated sclerosis, encephalitis, and brain tumour occasionally, the latter two being possibly dependent on disturbances of cerebral circulation. I am omitting, of course, dizziness due to exogenous intoxicants.

Numbness and tingling can be accepted more readily and without the same need for the exact meaning of the patient's words if he should speak of the part being dead or stiff, or feeling like pins and needles. Of greater importance is the distribution of this sensation.

Naturally its distribution over the limbs, and perhaps the body and face of one side, suggests a cerebral lesion. If it is reported as sudden in onset and transitory in duration, it may be interpreted as the aura of an epileptic attack, and one decides whether a neoplasm underlies this or a vascular lesion. If it is constant the same aetiologies present themselves for consideration, but an oncoming hemiplegia may be apprehended.

The numbness of tabes is usually confined to the feet alone, and if present elsewhere, is usually patchy and irregular in distribution. Numbness distributed over both hands and both feet is highly significant of the cord degeneration of pernicious anaemia or of peripheral neuritis.

There is a group of cases, however, of which I wish to speak particularly which may present all or any of these symptoms, and perhaps display eye palsies or other signs and which are greatly influenced, at least temporarily by a very simple form of treatment, six weeks' complete rest in bed, or as two cases demonstrate, may have serious consequences.

1. A man in the early forties of very hard-working habits suddenly developed numbness of the right side of the tongue and face, and had difficulty in articulating for twenty minutes. The next day he was definitely, though not completely, aphasic for the whole morning. Careful examination of the cardio-vascular and nervous systems by specialists in both fields revealed no abnormalities, and he was urged to go to bed for six weeks. This he neglected to do, but continued at work, and a month later dropped dead.

2. Another man of the same habits and approximately the same age suffered two dizzy attacks one morning while pressed for time on a motor tour. Suddenly he developed a hemianopia, later strabismus, and the next morning was hemiplegic. He was immediately put to bed for three months, and reports secured from his physician suggested no cardio-vascular disease, but typical neurological signs of hemiplegia

persisted for over a year, gradually lessening until he made complete recovery.

3. A man of twenty-six reported numbness of the right side as having existed for a month, also some indefinite disturbance of vision, probably a scotoma. His physician could not account for these symptoms, and the young man undertook a motor drive of one hundred miles, done rapidly over rough roads. That night he had a right hemiplegia, difficulty in articulation and swallowing, and had nystagmus and conjugate deviation of the eyes. He was kept three months in bed, made apparently a complete recovery, and three months later presented no physical abnormalities.

4. A married woman in the forties developed profound vertigo and eye palsies lasting for two days while on a motor trip somewhat over two years ago. I did not see her until a week or so later, during which time she was confined to bed. At this time I could find no signs of any disease. She was kept in bed for another month and has reported herself recently as having been free from all symptoms, except occasional undue fatigue, for which she is always sent to bed for a few days.

5. Another married woman in the late thirties developed diplopia eighteen months ago. She was kept in bed for three weeks, and then allowed to go to her summer cottage with instructions to be very lazy and keep out of the sun. The diplopia cleared up in a fortnight and she remained well till a year ago, when she attempted to do the family washing, including rubbing the children's stockings on the scrubbing board. This was followed by numbness of the left side of the face for several days. It is my opinion that if she had not been put back to bed for a week or so she might have suffered the serious consequences of one of the first three cases.

6. An unmarried girl of twenty-five had dizzy attacks, and numbness, and reduction of sensibility on the right side from June to September, 1928. This returned in January, 1929, and in June, 1929, she had stiffness of lower limbs for a month. No recurrence till February, 1931, then the dizzy attacks recurred and she had difficulty in writing due to clumsiness of the right hand, while the right leg was also ataxic. At this time she had her first neurological examination, and curiously enough neither at that time nor on several examinations since, did she show any definite abnormal objective signs in sensation or reflexes. She had always been put to bed for one or two weeks on the appearance of any of these symptoms, experiencing immediate benefit. Nevertheless she has lost many weeks from her work from repeated attacks and might have been totally and permanently disabled but for the comparatively short rests. After six weeks in bed in the Spring of 1931 she was allowed to return to light work, but on attempting much writing in November, 1931, the hand and arm and right side of trunk became numb, and the hand ataxic. Her duties were considerably lightened and no writing permitted till August, 1932, since which time she has been working steadily.

7. An unmarried girl of twenty-five had numbness of the right hand, and a reversal of sensibility in the left thigh, so that cold felt hot, in August, 1930, also weakness. She has gradually developed neurological signs, both in sensation and reflexes, and has shown the changing picture with different attacks so characteristic of Disseminated Sclerosis. This young woman has never had any occupation and leads a fairly leisurely existence, but it has been noticeable how intimately her recurrences have been associated with infection, usually of the upper respiratory tract.

8. A young woman of twenty-one was recently seen on account of a violent dizzy attack the night before. She had had a similar attack just a year ago, both attacks lasting less than one-half hour. In the first attack the

abdomen and the leg and arm of one side felt numb. In between the attacks she had taken a business course, and only a few days before this last attack had started work in a very busy office. Her only physical signs are absent abdominal reflexes and nystagmus. She has been advised to discontinue work.

None of these cases quoted have any serology suggestive of lues. None were cases of hypertension nor appreciable arterio-sclerosis. None had endocarditis, and none have given evidence of cerebral neoplasm.

At the present time all these would lead to the suspicion of Disseminated Sclerosis, although several occurred long enough ago to lead one to suspect Epidemic Encephalitis before it seemed to disappear from among us.

It is not my purpose, however, to discuss at length the exact diagnosis, but merely to point out that all were cases that presented these common symptoms, either in a mild degree or over a very short period of time. It is further my purpose to impress upon you that such symptoms, whether mild or of short duration, are always worthy of the most careful investigation because of their probable great importance, and to emphasize, perhaps more forcibly than I have done above, that physical effort usually aggravates the underlying condition to a serious or dangerous degree, and that prolonged rest has rendered a greater proportion of these cases symptom-free than I would have expected a number of years ago.

BOOK REVIEWS

THE ANATOMY OF THE HUMAN SKELETON. J. E. Frazer, F.R.C.S. 2nd Edition: J. and A. Churchill. viii 284 p.

Any student of Anatomy who is not familiar with the work of Frazer has not known one of the foremost works on the subject. The subject of anatomy is treated primarily from the study of the osseous system, but in such fashion as to render knowledge of the soft parts indispensable. It is a work that emphasizes the skeleton, but correlates it closely with the adjacent structures. Embryology and Comparative Anatomy are included, but in small measure, and that just sufficient to illustrate certain anatomical points and relations. The discussion of the skull is particularly lucid and easy to read as compared with other texts. The plates are excellent, and show an accuracy and detail that is to be found in no other book. This is a first ranking book and should be almost indispensable to F.R.C.S. candidates.

RECENT PROGRESS IN THE BIOCHEMISTRY OF THE VITAMINS AND HORMONES

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The past ten years have seen many surprising now developments in biochemistery. The particular fields which have perhaps yielded the most sensationally rapid results are those of vitamin and hormone research. Just over ten years ago the existence of only three dfferent vitamins was recognized — the growth-promoting, anti-xerophthalmic, anti-rachitic, fat-soluble vitamin A; the growth-promoting, anti-beri-beri, water-soluble vitamin B, and the antiscorbutic, water-soluble vitamin C. Nothing was known of the chemical nature of these vital accessory food factors, and in fact at that time, it was not uncommon to hear the view expressed by apparently intelligent individuals that vitamins were not chemical entities but rather were merely manifestations of obscure and mysterious properties of natural foodstuffs. This curious and illogical attitude was really a return to the vitalistic theory of a hundred years ago.

Two years ago, the position had undergone a striking change. Vitamin A had been divided into a growth-promoting, anti-xerophthalmic vitamin A, and an anti-rachitic vitamin D. It was known that vitamin A played an important role in the animal organism by maintaining its resistance to bacterial invasion; and it was known that the plant pigment, carotene—a highly unsaturated hydrocarbon of the formula $C_{40}H_{56}$—acted as a precursor of the vitamin, being converted into vitamin A in the body. The researches of Mrs. Mellanby had shown that vitamin D was necessary for proper calcification of the teeth and for maintaining a resistance to dental caries. It had been shown that vitamin D was formed from the trebly-unsaturated plant sterol, ergosterol, by the action of ultra-violet light, and the pure vitamin had actually been isolated in a state of chemical purity and had been shown to be isomeric with its precursor.

Vitamin B had also, by this time, been divided into several factors—the anti-beri-beri or antineuritic vitamin B_1, the anti-pellagric vitamin B_2, and several less-clearly defined factors which were labelled vitamins B_3, B_4, B_5 and B_6. Vitamin B_1 had been obtained in a form approximating to chemical purity, and it had been established that it was a nitrogenous base of relatively simple molecular dimensions.

Finally a new vitamin, present in certain vegetable foodstuffs which was necessary for the correct functioning of the reproductive organs of both sexes, was discovered and labelled vitamin E.

During the last two years, or rather it would be almost correct to say during the last few months, the advances in the vitamin field have been even more bewilderingly rapid. Three more of the vitamins have been isolated in states of chemical purity, the structural formulae of two of these has been determined with certainty, while one of them has actually been completely synthesized in the laboratory. Indications of the nature of the fundamental biochemical rôle in the animal body of three of these vitamins has also recently been obtained.

Nearlytwo years ago Karrer in Switzerland, and Drummond and Heilborn in England, succeeded in isolating halibut-liver oil a substance which appeared to be pure vitamin A. It pos-

sessed the formula $C_{20}H_{29}OH$, it was highly unsaturated and appeared to be formed by the fission of carotene ($C_{40}H_{56}$) into two halves. Karrer has recently provided clear cut proof of this theory of the constitution of vitamin A, by synthesing in the laboratory from b-ionone—a comparatively simple compound of known structure—a compound that proved to be identical in all respects with the product obtained by the catalytic reduction of pure vitamin A. The synthesis of the vitamin itself, although a much more difficult task, should not be beyond the skill of the organic chemists

The work of Professor Peters and his colleagues at Oxford has revealed the important fact that there is a large accumulation of lactic acid in the brains of pigeons suffering from polyneuritis resulting from a deficiency in the diet of vitamin B_1. It seems probable that the convulsive seizures characteristic of avian "beri-beri" are the direct result of this accumulation of unoxidised lactic acid. They have furthermore shown that the excised brains of polyneuritic pigeons are incapable of effecting the oxidation of added lactic acid *in vitro*, whereas after the addition of a small quantity of the chemically pure vitamin the excised brain is able to oxidise lactic acid as efficiently as a brain from a normal pigeon. This work provides the first demonstration of an *in vitro* action of any vitamin. In animal tissues lactic lacid is oxidised through the agency of the enzyme *lactic oxidase*. The presence of vitamin B_1 would appear to be necessary for the action of lactic oxidase and therefore we may say that one function at least of the vitamin in the body is to act as a *co-enzyme* for this particular oxidase.

Vitamin B_2 has recently been isolated in a state of purity by Kuhn. It has turned out to be a yellow nitrogenous pigment of the formula $C_{17}H_{20}N_4O_6$. So far its constitution is unknown. Like vitamin B_1, vitamin B_2 is probably intimately concerned with oxidative processes in the body. It possibly forms one part of a complex colloidal oxidase which has the power of oxidising hexosephosphoric acids. It also almost certainly can function as a hydrogen acceptor for tissue oxidations, just as methylene blue does in laboratory experiments. Kuhn has in fact called the vitamin "the methylene blue of living cells."

Vitamin C provides what is perhaps the most interesting story in the whole vitamin field. Nearly six years ago, Szent-Györgyi isolated from the cortex of the adrenal gland and also from oranges and lemons, a carbohydrate like substance of the formula $C_6H_8O_6$ which had powerful reducing properties and which he believed to play some important rôle in oxidative processes in animal and plant tissues. Two years ago, biological tests revealed that this substance possessed a powerful antiscorbutic potency, and more recently it has been established with some certainty that it is identical with vitamin C itself. This compound has therefore been named "ascorbic acid." Within the last few months, Haworth, Hirst and their collaborators at Birmingham University have determined the structural formula of this substance and have synthesised a compound which is identical with natural ascorbic acid.

The exact role of vitamin C in the body is not clear, but recent work makes it seem probable that it may facilitate the action of certain intracellular enzymes by maintaining a suitable reduction potential within the cell. The reason for the accumulation of large quantities of vitamin C in the adrenal cortex is at present quite obscure The relationship between the vitamin and the endocrine glands is further complicated by the discovery made a few weeks ago by Zilva that the anterior lobe of the hypophysis contains even larger amounts than the adrenal gland.

With the identification of ergosterol as the precursor of vitamin D and the isolation of the pure antirachitic agent from irradiated ergosterol, the chemis-

try of vitamin D appeared to be satisfactorily cleared up. There is, however a considerable amount of scattered evidence that calciferol may not be the only substance possessing antirachitic potency. It has been repeatedly claimed that by the action of heat on highly purified cholesterol, a substance is formed which is certainly not ergosterol, which can be activated into an antirachitic substance by ultra-violet irradiation. It has also been frequently reported that amounts of irradiated ergosterol and of cod-liver oil which have identical antirachitic potencies when tested on rats show different potencies when tested on human infants—the cod-liver oil being the more potent. This does not of course necessarily indicate a chemical difference between calciferol and the vitamin D of cod-liver oil. The observed differences in potency may be due merely to differences in completeness of absorption from the intestinal tract.

Last year Kon showed that the vitamin D in butter fat is almost certainly chemically distinct from calciferol and from the cod-liver oil vitamin D. The two latter are, as is well known, quite stable to saponification with hot alkalis. Butter-fat vitamin D, on the other hand. was almost completely destroyed by saponification.

While none of this evidence is completely satisfactory, it nevertheless cannot be denied that there are strong indications that calciferol is not the only naturally occurring antirachitic agent.

During the last ten years our knowledge of the functions of the endocrine glands and our knowledge of the chemical nature of the hormones which they secrete has been enormously enlarged. Interest has recently been centered largely in the hormones of the reproductive organs and of the anterior lobe of the hypophysis.

The discovery in 1927 by Aschheim and Zondek that the urine of pregnant women contained large amounts of a substance possessing an oestrus-producing action similar to that possessed by extracts of ovarian tissue, paved the way to the isolation of the hormone in a state of purity by providing a cheap and plentiful source of the active substance. Within three years, the isolation of chemically pure oestrus-producing substances was reported almost simultaneously from four different laboratories, in the United States, Germany, Holland and England. It was found that human pregnancy urine contained two closely related but different oestrus - producing substances; a hydroxyketone, $C_{18}H_{22}O_2$, now known as *oestrone* by British workers; and a trihydroxy compound, $C_{18}H_{24}O_3$, known as *oestriol*. Recent work from a French laboratory has shown that in addition to these the urine of pregnant mares contains three or more other oestrus-producing hydroxyketones differing from oestrone in containing fewer hydrogen atoms.

It now is satisfactorily proved that these oestrus-producing hormones are chemically closely related to the sterols and bile acids, and it is an attractive hypothesis that the latter compounds may be the precursors of the oestrin group of hormones in the body. One can visualise oestrone being formed from a bile acid by a process involving removal of the aliphatic side chain, and the dehydrogenation of one of the reduced six-membered carbon rings so that it becomes aromatic in nature.

An interesting recent development in the sex-hormone field is the discovery made last year by Cook and Dodds that various complex synthetic derivatives of the aromatic hydrocarbon phenanthrene possess a weak but quite definite oestrus - producing potency when tested on ovariectomised animals. The still more surprising fact was discovered that ergosterol and pure vitamin D also showed slight oestrogenic potency. It would therefore appear that oestrogenic potency is not a property confined to the naturally occurring hormones, but may be shown by a considerable number of compounds

possessing condensed ring carbon skeletons. A partially reduced phenanthrene carbon skeleton is common to the natural hormones and to these synthetic oestrogenic compounds. These facts stress the previously recognized biological importance of phenanthrene derivatives. It has been shown many years ago that the pharmacological potency of certain of the vegetable alkaloids is due not only to the nitrogen atoms but also to some extent to the presence of this same phenanthrene ring system.

It is now some years since the presence in testes extracts of a substance capable of abolishing the typical castration effects in male animals was discovered to be formally present in male urine This unirary substance has recently been isolated by Butenandt in small amounts in a pure crystalline form and seems to be a hydroxyketone of the formula $C_{19}H_{30}O_2$. Its constitution has so far not been fully worked out, but it seems probable that like the oestrin group of hormones it may be a sterol derivative. This work on the male hormone provides an excellent example of the great difficulties that may be encountered in this type of biochemical research. Butenandt succeeded in isolating only 15 mgms. of the pure hormone after working up as much as 15,000 litres of male urine. It is hardly surprising in view of the small amounts available that the constitution of the hormone has not yet been elucidated. It seems probable that the active principal present in male urine may be different chemically to that present in the testis, since the latter is rapdly destroyed by alkalne saponification, whereas the former is perfectly stable.

Progress in our knowledge of the nature of the hormones of the anterior pituitary has been mainly along physiological lines. In addition to the hormone or hormones controlling the growth and endocrine activity of the gonads, there are present, a hormone stimulating general body growth, one stimulating the activity of the thyroid gland, one stimulating the activity of the adrenal cortex, one causing lactation, and one which plays some rôle in carbohydrate metabolism. These hormones have been now separated from one another, but it is very doubtful if any of them have been so far obtained in a state even approximating to purity. They seem to be all of a protein-like nature and therefore it is evident that their isolation in a chemically pure form will be a task of considerable magnitude.

There is present in human pregnancy urine in addition to oestrin, a substance having a similar physiological action to that of the gonad-stimulating fraction of the anterior pituitary hormones. The presence of this substance in pregnancy urine provides the basis for the well-known and reliable Ascheim-Zondek pregnancy test. Certain slight differences in physiological action suggest that this substance is not identical with the pituitary gonad stimulating hormone. Considerable progress has been made in the purification of this principal (usually known as *prolan*), and although it has not yet been obtained in a state of purity, the chemical properties of the purest fractions so far obtained indicate that it is probably a polypeptide of a molecular weight of 700 - 800.

The tremendous advances made recently in the hormone and vitamin fields are possibly due to a great extent to the increased use of the methods of organic chemistry by biochemists and to the increased interest in biochemical problems among organic chemists. Until quite recently it was a rare occurrence to find a biochemist in any country but Germany who was also an organic chemist, or an organic chemist who had any interest in biochemical problems. The closer co-operation of the biochemist and the organic chemist which holds to-day is certainly doing much to advance medical science in general.

THE HISTORICAL DEVELOPMENT OF THE X-RAY

DOROTHY E. REDMOND, '39.

In January, 1896, one of the best American scientific periodicals printed two cautious articles on the same page. The one was in a sceptical vein on the subject of the "horseless carriage", while the second quoted, and then remarked upon, a most amazing cable which had come from a Professor Röentgen of Wurzburg University in Germany. This scientist stated that he had discovered a new kind of light which would penetrate solids. The journal, fearing to appear too radical, commented: "It is yet too soon to indulge in the wild possibilities that have been suggested for this process. When the details reach us, the process will probably prove to be of scientific rather than of practical interest." 1934 finds the Röentgen or X-Rays a commonplace in practical use. What has happened in the intervening forty years?

Wilhelm Konrad von Röentgen was a Prussian physicist interested primarily in relating physics to physiological problems. He held various positions as professor of his chosen subject before going to Wurzburg in the same capacity, in the year 1885. At that time Hertz, a German physicist, was working on an experiment which finally resulted in the discovery that electric sparks create a wave in the air. Röentgen had always been interested in electrical and magnetic difficulties, and Hertz' discovery heightened this interest. He was curious to know if cathode rays were composed of particles of luminous matter. Then it occurred to him that particles of matter might show signs of friction in passing around a bend in glass. So in true scientific manner, in 1892, Röentgen blew a vacuum tube with S-tubes at each end of it. But although he sent a large electrical charge through this vacuum, he saw no signs of friction. After performing other similar experiments, he by chance noticed one time that a fluorescent screen lying on a table some three metres distant was shining out brightly. Various other stories have been related as to the exact manner in which this chance discovery was made, but all of them agree that Röentgen was convinced that certain rays must be coming off from his vacuum tube. The next thing was to discover their properties. Although they were invisible, Röentgen found that they penetrated wood, cloth and many metals. Then he placed his hand between the screen and the tube, and the outline of the bones showed through the flesh. Further investigation showed that these rays, which their discoverer called X-rays, due to their unknown quality, were produced whenever and wherever cathode rays encountered matter. This was only the beginning of the disclosing of the secrets of the X-ray.

The fact that parts of the body could be rendered sufficiently diaphanous for inspection, opened up a complete new vista for science. Röentgen continued his study of the new rays, and other scientists likewise saw the possibilities in the field. An apparatus for the use of the rays followed soon after their discovery. It consisted of a glass tube into which were sealed two poles. The gas or air in the tube was pumped out to almost a complete vacuum. The rays were then produced by accelerating electrons in the vacuum by means of applied high viltage. The cathode stream struck against a metal target from which the rays were then generated. As time went on it was discovered that the rays could be reflected and refracted by crystals, but that they were not deflected by a mag-

netic field. They also affected a photographic plate, and reflected in barium platinocyanide. These peculiar qualities of X-rays soon pointed to their usefulness in medical lines. Ordinary tissue was transparent to them. The bones were opaque, while the lungs, liver and other organs were partly so. Scientists foresaw that with these rays the secrets of internal derangements might be revealed. Guess-work in diagnosis would be done away with, and the use of the rays would prove, in time, to be indispensable.

But there were drawbacks to this process which had to be discovered by sacrifice. While Röntgen continued to investigate, Dr. J. Hall-Edwards, of Birmingham, began research work early in 1896. He discovered that the X-rays could be used to cure superficial diseases. But while he treated his patients, ulcers appeared on his hands, and then invaded his body. He did not cease from his experiments and treatments, however, until the rays had practically disabled his. Thus Dr. Hall-Edwards, by his persistent heroism, brought to light the fact that although absorbed in sufficient quantity of healthy tissue, X-rays prove most destructive, yet as this effect is more pronounced on unhealthy tissue than on sound, a slight treatment with them is most valuable for skin diseases. Some time later Thomas Edison also suffered in his experimental work from this disease, dermatitis, which is now looked upon as a form of cancer, and an assistant of his, Mr. Clarence Dally, lost his life in a similar manner. Since that time it has been discovered that X-rays cannot penetrate lead, and that metal is now used as a means of protection for those administering ray treatment.

Many have experimented on this branch of scientific work since 1895, but it is the results of their investigatons rather than their names which persist. It was not enough to discover that small dosages of X-radiation tend to activate and to stimulate various functions of the body while larger amounts tend to destroy. The technique of the application of X-rays next called for continual study. The complexities of their biological effect as modified by a varying sensitivity, both local and general, had to be considered. As a result of experiment, the quality and quantity of radiation desirable has now reached a fair degree of accuracy.

Thus at the present time over one hundred diseases can be aided by judicious use of the X-radiation. But it is in the sphere of diagnosis that the greatest advances have been make. The Röentgenographic method, based upon the action of X-rays on a photographic film, has gradually been built up, and improved. By this method the hand or other part of the body to be X-rayed is placed upon a photographic plate, and properly exposed to the rays. The film is then developed in a chemical solution, and an image of the hand is disclosed. This is a shadow image of the dense bone showing all of its intricate structure, surrounded by a darker shadow image of the less-dense flesh. As various densities produce different degrees of blackness on the photographic film, not only broken bones and foreign bodies may be discerned, but also disorders of the digestive tract. By the introduction of harmless, heavy substances, the digestive tract is made relatively opaque. Thus by watching a patient who has eaten a small amount of bismuth with his food, the whole process of digestion is made visible by the X-rays, and it is possible to locate the exact spot where the process goes wrong. The second and more recently-discovered method is based on the principle that certain chemicals fluoresce when exposed to X-rays. When a part of the body is to be fluoroscoped, the room is completely darkened, and the part to be examed is placed between the X-ray tube and a screen coated with barium platinocyanide or cadmium tungstate. When the switch is turned on, the differences in density of body tissues are

more or less apparent due to the varying degrees of fluorescence. This process is used most frequently for examination of the lungs, and of the alimentary canal.

These elaborate processes have been evolved and have been improved upon in a comparatively short time. Röentgen's discovery has also led to the field of Radio Activity, which offers a store of possibilities to twentieth-century investigators. Science advances, building always on previously-accepted scientific facts. It seems probable that the improvement of Röentgen's discovery of the latter part of the nineteenth century may prove to be one of the main scientific foundations of this century, on which future ages may build.

THE WOMEN PHYSICIANS

EDNA M. GUEST, M.D.

The women physicians of Toronto are particularly interested in two projects just now, one, the building of the new Women's College Hospital, which is to be situated at the head of Elizabeth street, facing down to College St., —the other, the part the Academy of Medicine is taking in Toronto's centenary celebration this year.

The latter has stimulated much research into the history of the medical graduates, the medical schools, hospitals and other medical institutions,—ancient equipment, instruments, treatment machines and even the vehicles of conveyance of our ancestors of a century ago.

It has been interesting to find that the hundredth anniversary of Toronto as a city is the fiftieth anniversary of the tacking up of a little brass plate, announcing the beginning of practice in Toronto of the first woman to graduate from a Canadian Medical School.

Dr. Augusta Stowe graduated in Toronto in 1883, was married to one of her classmates, Dr. J. B. Gullen, immediately following Convocation, and after spending one year in post graduate study in New York City, they returned to Toronto and gaily but solemnly tacked up their two brass plates beside the front door of their home.

We are happy to find that fifty years of married life and fifty years of successful practise of medicine has moulded them into the still scientific but the most genial, witty and altogether charming host and hostess in one of Toronto's most hospitable drawing-rooms.

It is of almost equal interest for the 1933-4 freshettes in Medicine to know that just fifty years ago, the first freshettes (three in number with two special students) registered in the first Medical College for Women in Canada, a little building on Sumach St., Toronto. The first student to register is still living and is the charming mother of our much respected and very distinguished paediatrician, Dr. Alan Brown of the Hospital for Sick Children.

Space alone forbids a further delving just now, into this most fascinating history of our past.

AN ADDRESS

DELIVERED BEFORE AN OPEN MEETING OF
THE MEDICAL SOCIETY OF THE UNIVERSITY OF TORONTO
ON WEDNESDAY, JANUARY 17th, 1934.

BY

THE HON. HERBERT A. BRUCE, M.D.,
Lieutenant-Governor of Ontario.

It is related that George Gissing the novelist, being homeless and penniless on the streets of London, used to find shelter in the warmth and *comparative* security of the washroom of the British Museum. One day, however, yet another misfortune overtook the poor novelist. To his intense embarrassment a hard-hearted and very angry trustee of the Museum surprised him in the washroom when he was in the very act of using the washstand for bath-tub and laundry. And now in that washroom there is this sign—"THESE BASINS ARE FOR CASUAL ABLUTIONS ONLY."

Now, if only for the sake of public hygiene the proper use of a wash-basin—and more especially a *public* wash-basin—can be *clearly* defined if only for the guidance of erring novelists and such others as may be driven by necessity to ignore convention. But I feel that no such limitations can be set to the topics considered fit and proper for discussion before medical students. I cannot imagine any group of subjects over which may be placed the legend—THESE SUBJECTS ARE FOR MEDICAL STUDENTS ONLY.

I propose to speak to you, therefore, not as a specialist discussing a special subject, but rather as one who has engaged in most of the multifarious activities inseparable from a busy life in the profession you are now entering. I intend to be discursive rather than particular, while for a short time diverting your attention away from the daily studies imposed upon you by an over-indulgent Faculty, and direct your attention to the *Profession of Medicine* itself.

And now that you know that for a time at least you are to be delivered from the necessity of listening to a dissertation on some academic subject, I can imagine someone remarking, as Francisco, the soldier, remarked in the opening scene of Hamlet, "For this relief, much thanks."

To say of anyone that he is in a profession implies, of course that he *professes* something. And if the profession happens to be that of medicine, then we assume quite rightly that a member of that profession knows a great deal more than the *average* person about *medicine* and about all those beneficent agencies of health and healing which we instinctively associate with physicians and surgeons.

These assumptions are, of course, correct. But what I wish to point out is, that if you are content to think of a physician simply as a person who has studied medicine, and of a surgeon as one who has practised surgery, then you have a narrow, utilitarian and altogether unworthy estimation of the profession you propose following.

For the Profession of Medicine is not a trade nor is it a business. It is an art which demands not merely knowledge but understanding. It calls for the exercise of sympathy and discretion and that wisdom which enables one to interpret the hearts and minds of men. In the words of Sir James Paget, the Profession of Medicine "offers the most complete and constant union of those three qualities which have the greatest charm for pure and active minds—novelty, utility and charity."

I am aware, of course, that as medical students you see before you examinations which loom like dark portents of troubles to come. It is inevitable, therefore, that you should be led to concentrate upon immediate aims, upon those studies which will enable you in due course to qualify as members of the great Profession of Medicine. But I am anxious that even as students you should cultivate the larger view of your profession—that broad outlook which distinguishes the comprehensive mind. And it is chiefly because of a marked tendency of the day to specialize more and more upon less and less that I hope my few remarks will warn you of the very real danger of a narrowing down of your interests. For that inevitably leads to a small-mindedness from which prejudice has usurped the place of that wisdom which it will be your duty to cultivate assiduously throughout your life of service to your fellow-men. The Profession of Medicine is more than a profession. It is nothing less than a way of life—a broad way of life—a way of life that is second to none when engaged in to the full extent of your powers.

Kipling once exclaimed: "What does

he know of England who only England knows?" And that question strikes at the very roots of ignorance—the very type of ignorance which it is the purpose of all true education to overcome. I might as pertinently ask you what does the physician know of medicine who only knows the component parts of the medicines he prescribes? Or what does he know of Canada who only Canada knows?

And it might be well to state at this point that the commonest expression of this narrowness of outlook is found in a petty nationalism. Ignorance is nowhere more manifest than in the bombastic pratings of a parochialism which preens itself on nothing more substantial than its geographical position.

Now, since I have already spoken of the Profession of Medicine as something which is *more* than a profession, I might well describe the men I shall mention as *more* than doctors. And by that I mean simply that they regarded their profession as something more than a humdrum matter of routine. They found in it opportunities for that self-development which is true culture. While conscientiously engaged in their profession and delighting in its practice, they yet contrived to enrich their minds with *other* than medical knowledge, thus making themselves true citizens of the world. It is as if they seized and made their own the intellectual spoils snatched by a hungry mind from books during brief intervals of study in the normal busy life of a physician.

In the year 1671, King Charles II visited the city of Norwich in the county of Norfolk. There he conferred knighthood on a bashful, unobtrusive little doctor who was so very modest that, to quote a gentleman who knew him, "his modesty was visible in a natural habitual *blush* which was increased upon the least occasion, and oft discovered without any observable cause".

I must leave it to you to picture the so visible embarrassment of *Dr.* Thomas Browne on the day that he became *Sir* Thomas Browne. You may well smile—even as, doubtless, his friends smiled—though affectionately—at thought of the deepening hues of colour blazing pitilessly on the face of this old scholar as he bowed beneath the sword of his King.

And yet this same shy Sir Thomas Browne, the author of the "Religio Medici", is as certain of an immortality of fame as any of his 17th century contemporaries. Coleridge, the poet, describes him as "a fine mixture of humourist, genius and pedant". But he was even more than that. To this day, indeed, the astonishing erudition displayed in his book, the inimitable dignity and polish of its style, its majestic thunderings, its subtleties of phrasing, its wit, its vigour and the variousness of its beauty combine to hold in perpetual homage to Sir Thomas Browne scholars, students and readers of every age and clime.

Modest Doctor Browne, living in Norwich, industriously occupied with an extensive practice and the education of his children, yet contrived to write that great book—the "Religio Medici".

Now Sir Thomas Browne is but one of those doctors who were more than doctors because they sent their minds far afield on journeys of exploration into *every* part of the Kingdom of Knowledge. With what they found there they made books—monuments to their enduring fame. But the range of Sir Thomas Browne's knowledge is so astounding, his wisdom so deep and unaffected, that he best exemplifies, even as he transcends all the others.

You must not be led to think, however, that men like Sir Thomas have long ceased to exist. The greatest possession of any university is its great names, and just as Sir Thomas brought undying honour to the city of Norwich, so Sir Wm. Osler conferred on this city and this University a claim to distinction and high regard in every part of the world.

I recall hearing Sir Wm. Osler speaking of the necessity of a broad, comprehensive culture. He recommended to students what he termed "*bedside books*", and said: "Well filled though the day be with appointed tasks, to make the best possible use of your *one* or of your *ten* talents, rest not satisfied with this professional training but try to get the education, if not of a scholar, at least of a gentleman." And among the books he named were none other than the "Religio Medici" of Sir Thomas Browne and the "Breakfast Table Series" by Dr. Oliver Wendell Holmes, of whom I shall have more to say later.

You know, of course, that Sir Wm. Osler graduated from the Toronto School of Medicine, then went to McGill University, later became a professor at Johns Hopkins University, and was subsequently elected to a much-coveted position—that of Regius Professor of Medicine at the University of Oxford. He is probably our most widely-known graduate — known wherever medicine is practised.

Whenever I think of Sir Wm. Osler I recall the tragic circumstances of the death of his only son in France in August, 1917. He died from wounds in a casualty clearing station near Poperinghe, only a few miles from the clearing station in which I was myself on duty. A few hundred yards from me Dr. Harvey Cushing served in yet another casualty clearing station, and when the mortally-wounded boy was carried into the casualty clearing station some miles away, Dr. Finney, of Baltimore, Dr. Wm. Darrach, of New York, and Dr. Crile, of Cleveland—all of them famous American surgeons—were there to

do all they could to save his life. I recall, too, the comfort and satisfaction which Sir William felt at the knowledge that these men were at hand to do all they could to save the life of his son. We are happy to possess a copy at the Academy of Medicine of the excellent portrait of Sir Wm. Osler painted by Orpen—the original of which now hangs in Johns Hopkins University.

Let me now tell you of two doctor-authors well known to you. Then I will attempt to show you as clearly as I can why the qualities which a doctor should possess—the qualities of acute observation and accurate deductions—are but the tools of an active intelligence—tools which can operate in every field of human activity and should not be confined within the narrow compass of any one profession or any one field of knowledge to the exclusion of all others.

I want to refer for a moment to a gentleman whose name is familiar to everyone of you. You probably know more about his habits and characteristics than you do about those of any but your most intimate friends. He is a man who couldn't venture into the streets of any city in the world in his customary garb without gathering hugh crowds about him; his name is known wherever the English language is spoken. Letters continue to be sent to his private address. And yet this man never existed—he was brought to life and created by a young doctor.

Toward the end of the last century Dr. Joseph Bell, F.R.C.S. Edin., was a University teacher with uncanny ability as a diagnostician. Dr. Bell was a thin man, wiry and dark. He had a sharp face adorned with a high Roman nose and keen grey eyes, and he walked in a peculiar manner. He had as his out-patient clerk an observant young medical student named Doyle. With youthful awe Doyle used to watch Dr. Bell diagnosing patients the moment they entered the room. He appeared to know all about them *before they even opened their mouths.* This is the sort of thing that Doyle used to observe happen frequently. A civilian patient one day entered the room. Dr. Bell glanced at him.

"Well, my man," he observed, "you've served in the army."

"Aye, Sir."

"Not long discharged?"

"No, Sir."

"A Highland regiment?"

"Aye, Sir."

"Stationed at Barbados?"

"Aye, Sir."

"You see, gentlemen," the doctor explained to his surprised students, "the man was a respectful man but did not remove his hat. They do *not* in the army. If he had been long discharged he would have learned civilian ways. He is obviously Scottish. As to Barbados, his complaint is 'elephantiasis', which is West Indian and not British."

It is necessary to tell you that the young medical student's full name was Arthur Conan Doyle—later Sir Arthur Conan Doyle, who, out of his memories of Dr. Joseph Bell, created Sherlock Holmes. Isn't the very description of Dr. Bell—thin, wiry, dark, with a face not unlike that of a Red Indian—the description too, of the detective of Baker St., London, England? Here was a man, a famous detective, who never existed! Yet he was so very much alive that when Conan Doyle, being no longer in need of cash, killed him by dropping him with his arch-enemy, Moriarty, into a crevass at Reichenbach in the Tyrolean Alps, the shock was too great for the reading public. The catastrophe caused such universal sorrow that Doyle had to bring the detective to life again and start him on new adventures, solving new problems of crime. And the gratitude of the people was so great that Arthur Conan Doyle was knighted—for the resurrection of Sherlock Holmes.

And in the very name of Sherlock Holmes, by the way, there is an interesting link with yet another doctor—a link that spans the Atlantic Ocean. Conan Doyle was a great admirer of Dr. Oliver Wendell Holmes, of Boston, Mass., and in the name of the creature of his brain one doctor has conferred yet another type of fame on a doctor already famous. In Sherlock Holmes the name of Dr. Holmes is commemorated by Dr. Conan Doyle.

Oliver Wendell Holmes died in 1894 at the age of 85, and to typify the type of mind which, while centering upon its profession as its main activity and interest, yet finds time and opportunity to encompass vast tracts of learning in its orbit, the author of "The Autocrat at the Breakfast Table" and "The Professor at the Breakfast Table" serves my purpose excellently. Whittier, the poet, said of Dr. Holmes that "his varied qualities would suffice for the mental furnishing of half a dozen literary specialists. He is a Montaigne and Bacon under one hat."

Something of what I can only call the "Multiplicity" of mind of old Sir Thomas Browne lived again in this witty, genial doctor of Boston. Perhaps you will regard his books as old-fashioned, though they are of the type which never goes out of fashion. In them he reveals his breadth and sanity of mind—those qualities that have endeared him to countless readers here and in the Old World. He reveals too that he was like Sir Thomas Browne in yet another characteristic. Just as old Sir Thomas loved Norwich, so Dr. Oliver

Wendell Holmes loved Boston. His books brim over with his love for Boston and his affection for the antiquities and traditions of New England. It was Dr. Holmes, I believe, who first called tuberculosis "the white plague".

I do not intend, when I speak thus of doctors who have become famous as authors, to suggest that you should attempt to do likewise at the first opportunity. By no means. Indeed, I plead with you that, above all, you be loyal to the profession of your choice and jealous of its honour. But I want to show you that the frequency with which doctors have deserted their first loves—the medicine bottle and the scalpel, and embraced a pen and a bottle of ink, is something more than a coincidence. And the fact that in so doing doctors have again and again won renown as authors is not as surprising as may at first appear.

Here, you will admit, is a state of affairs that merits examination. Obviously, there must be some reason for this link between medicine and literature, between the type of mind that gazes at humanity through the microscope and the X-ray; and that other type of mind, the literary mind, which view humanity through the eyes of imagination and reveals what it discovers with a pen.

If, as Rudyard Kipling avers, "Judy O'Grady and the Colonel's lady are sisters under the skin," then there should also be some discoverable relationship—some affinity—between medicine and literature. Sir Thomas Browne is but one, and not even historically the *first*, of a long line of literary doctors whose work has, from time to time, enriched English and—if I must make a distinction—American literature. What is it that the doctor, the scholar, the author, and indeed all men of liberal parts, have in common? I could answer in a single sentence by saying that they all have a consuming interest in life in *all* its manifestations. But that is not enough. I propose demonstrating to you not only what a broad-visoned profession it is that you have chosen, but also and by inference how intimately it is bound up with and is a part of the world of men and women whom it will be your privilege and duty to serve. I want you at the outset of your careers to realize that medicine is a humanitarian service rather than a doctrinaire science.

You may recollect that in introducing my topic this afternoon I spoke of the rather narrow limits within which convention or pedantry might seek to confine the range of subjects considered suitable for medical students. I stated that I, at all events, would not be restricted in my choice of a subject by any such artificial limitations. I am anxious to impress upon you the wisdom and, indeed, the necessity of this larger view of your profession. And the link I am establishing between literature and medicine is one which may be extended to include all the arts and sciences which legitimately come within the province of the student whatever may be the particular avenue of enquiry along which he pursues his studies, and no matter what the particular subject he is studying. To know that subject is to possess *knowledge*, but to be able to correlate it with all other subjects is to possess *wisdom*.

But to return to our friends the literary doctors. While it is true that the life of a doctor, like that of a medical student, is bounded on one side by medical textbooks, scientific and diagnostic apparatus, operating theatres and hospital wards, and all the paraphernalia of the physician and surgeon, yet on the other side it has no boundaries whatever. It extends over the whole life of humanity, touching it at every point, reaching to the heights and depths of human existence. And it is on this side that the writer and the doctor meet. It is here that literature and medicine and indeed all the liberal arts and sciences find themselves contemplating the same scenes—the scenes that reveal the heroism of mankind and its follies, its majesty and its idealism and its depravity, its hopes, its perplexities, its fear of death and its joy in life. Pain and laughter, mirth and despair, all inextricably tangled, yet mysteriously woven into the curious, ever-changing, colourful pattern of life, and lights and shades of our mortal existence.

Now ask yourselves this question: Who so closely, so clearly and with such daily intimacy sees this life as the *doctor?* For literature and the science of medicine may be likened to two roads along one of which you have chosen to make your way. These roads do not run parallel and they pass through different regions in the Kingdom of Knowledge. Yet they both lead straight into the homes of men and women, to their deepest thoughts and emotions and to all that concerns them most closely.

So much then for your profession in its true relation to the world about you. All that I have sought to show you is that you should never be content with what you know and never confine that knowledge wholly to one subject, excluding others. Go on learning. If you have mastered one subject, master another. Alexander Pope, the poet, says that "A *little* knowledge is a dangerous thing." But who is there who knows so much as to be out of danger? I do not, of course, suggest that you be like the man in Alcibiades II, to whom are applied the words of the poet:—

Full many a thing he knew
But knew them all badly.

But by giving you an enlarged and more comprehensive view of your profession I have sought to warn you of the danger of narrow-minded pedantry within the necessarily narrow confines of any profession regarded in its limited and purely technical sense. Incessant concentration upon immediate aims, too often tends to get you into a rut, to smother your most vital energies with routine. To live wisely is to learn unceasingly. And on the day of your graduation it may be well to remember these words of Sir Thomas Browne: "It is the nimble and conceited heads that never looked a degree beyond their nests (in this case their profession or even their University) that plume themselves on light attainments, but heads of capacity and such as are not full of a handful or *easy* measure of knowledge think they know *nothing* till they know all." And that is, of course, *never*. No man ever knows all.

With all your natural affection too for your alma mater and the scenes of your youth, remember that knowledge has never yet been given a local habitation and a name. Wisdom is the monopoly of no one country, University or city. It is to be found everywhere.

And now I would like to say something about your profession *as a profession*, without any consideration of that broader culture which may be yours if you use medicine as the starting point for what I may term cultural attainments.

In the year 1918 I was sent on a mission to the United States with Sir James Mackenzie. And as an apt beginning to what I wish to say to you, I cannot do better, perhaps, than quote to you this passage in Sir Jas. Mackenzie's book, "The Future of Medicine": "As years go by," he writes, "and as physicians become more expert in detecting auricular fibrillations of the heart and all its symptoms, it will be more and more recognized that its discovery forms a landmark in cardiac clinical pathology. I may be excused," he adds—and this is most important; "I may be excused if I insist upon the fact that all the essential details associated with this condition, its symptomatology, its relation to heart failure, its response to digitalis, were all discovered by the simple means available to a doctor in *general practice*. (He refers, of course, to his own discovery.)

"Moreover, and this is the point I wish to make, the recognition of this condition as a clinical entity and all it implies *could not have been made by investigation, however capable, if they had restricted themselves to laboratory and hospital ward.*"

Now very conveniently the doctors I have spoken to you about divide themselves into three classes. I have spoken of doctors who, while practising their profession, acquired that breadth of culture which, for want of a better description, I described as making them *more* than doctors. Then I spoke of doctors who, possessing the qualities which the true doctor should possess, yet found need to express themselves in writing to record their observations of humanity, and became writers—often leaving their profession of medicine. And now there is the third class, of which Sir James Mackenzie is a representative. They are the *great doctors*. Men who have brought honour to their chosen profession, and incalculable relief to ailing humanity. They are men, who, by their labours, their persistence and their patience, have left a legacy of new discovery or successful experiment by which medical science has been empowered to battle more successfully against disease and push still further forward the frontiers of medical science. One and all they are men worthy of your emulation.

As if to bear out Sir James Mackenzie's contention that the observation of a general practitioner are of the greatest value, it is interesting to note that Sir James, in his new hospital at St. Andrews, relied in his research into the earliest symptoms of diseases, chiefly upon general practitioners.

And the importance of this is that, just as it is necessary for you to direct your attention to the broader implications of your profession in its relation to life in general, so *within* the profession itself there is every need for a correction of that latter-day tendency toward over-specialization. There should always be a *broadening out* rather than a *narrowing down* of a physician's work, a more *general* practice of medicine rather than a limited specialization in a single branch of medicine. In this way alone are students and physicians alike able to see the different branches of medicine in their proper perspective and be able to correlate them. The dominant figure in the world of medicine is, and will remain, the physician—the general practitioner. It is he who sees disease in *all* its phases.

The story is told of a gentleman named Abernethy who, seeing a large class of medical students, exclaimed "Good God, gentlemen! Whatever will become of you?" And although many of you, no doubt, cherish the ambition of becoming specialists in one or another of the numerous branches of medicine, I can wish for none of you a fuller life or a more laudable career than that of a general practitioner, serving his fellow-men, not in one way alone, but in every way. It is a life of responsibility, but it is a full life and almost alone calls for all those qualities

of heart and mind which most fully reveal the man behind the physician. It will lead to the greatest satisfactions and completest fulfilment to which you can look forward when the doors of this University close behind you for the last time and your life as a doctor begins.

But as I conclude I do so with a very real sense of the importance of what I am about to say to you. I have spoken of great men. I have named men who have immortalized their names by their greatness of mind, their vision—men who have *brought* something to their profession rather than sought to *get* something from it. I have spoken of men of culture—medical men whose scholarly spirit lived again in such men as Irving H. Cameron, for many years Professory of Surgery in this University, who but recently passed away.

You may imagine the pleasure then with which I now speak of one who belongs to this University, who is a Nobel Prize winner and a benefactor of humanity; he has earned, by his work, an immortality of fame that is as assured as that of Pasteur or Lister, and yet he has the modesty of a Sir Thomas Browne, combined, however, with the capacity for investigation which distinguishes all great scientists—of course I refer to Dr. Banting, the discoverer of Insulin.

The invaluable contribution to medical knowledge made by Drs. Banting and Best in their discovery of Insulin eleven years ago and the tremendous importance of that discovery has been accentuated with the passing of years. The far-reaching effects of this great boon to mankind have more than realized the most sanguine expectations of those who recognized its possibilities when it was first discovered.

The promptness with which the Legislature of the Province of Ontario made a special grant for the establishment of a Department of Medical Research under the guidance of Dr. Banting was a just recognition of the value of his work, and received universal praise.

On a recent visit I was able to see these great laboratories staffed by eager workers from places as far distant as Victoria in the west and Halifax in the east, as well as from such intervening points as Brandon, McGill and Queen's.

The department has steadily grown and now has three divisions—Biochemistry, Pathology and Physiology, and is thus in a position to attack the major problems in Medical Research, as well as developing and guiding younger students who have a desire to investigate problems which are suggested by their Medical studies.

I found that one of the major problems under investigation in this department is that of Silicosis. Silicosis, as you know, in an industrial disease caused by the inhalation of silica dust resulting in extensive fibrosis of the lungs. The investigation has been carried on in cooperation with the Ontario Mining Association and the Ontario Department of Public Health.

Dr. Irwin has studied the tissue changes in experimental animals in which the disease has been reproduced.

Dr. King has devised micro chemical methods by which silica can be determined in small quantities of body fluids and tissues.

A photometric apparatus has been developed by which an estimation of the number of dust particles in the air could be rapidly made. This method will facilitate a survey of the dust conditions in mines or elsewhere.

Dr. Franks sought to prevent silicosis by cleaning the air of dangerous silica particles. This is done by drawing the dust through an electric field where the particles are precipitated. An apparatus embodying this principle is at present on trial in the McIntyre Mines, and, I understand, with satisfactory results.

Many other problems are under investigation, perhaps the most interesting of which are the growth of tumours and tumour cell metabolism which will undoubtedly advance our knowledge of this difficult problem, and which, combined with investigations going on elsewhere, will, we hope, within a reasonable period, lead to the complete elucidation of this subject with benefit to countless sufferers.

I hope such work will be an inspiration to you, and that you will regard the men I have mentioned as exemplars of all that most befits the noblest of all professions.

Let me close with these words of Robert Stevenson:

"There are men and classes of men," says Stevenson, "that stand above the common herd; the soldier, the sailor, and the shepherd not infrequently; the artist rarely; rarelier still, the clergyman; the physician almost as a rule. He is the flower (such as it is) of our civilization; and when that stage of man is done with, and only to be marvelled at in history, he will be thought to have shared as little as any in the defects of the period, and most notably exhibited the virtues of the race. *Generosity* he has, such as is possible to those who practise an art, never to those who drive a trade; *discretion*, tested by a hundred secrets; *tact*, tried in a thousand embarrassments; and what are more important, Herculean *cheerfulness* and *courage*. So that he brings air and cheer into the sick room, and often enough, though not so often as he wishes, brings healing."

One of a series of advertisements prepared and published by PARKE, DAVIS & CO. in behalf of the medical profession. This "See Your Doctor" campaign is running in the *Saturday Evening Post, Maclean's* and other leading magazines.

The letter that took him months to write

DEAR DOCTOR:

I have just had a very unusual experience. I actually *enjoyed* paying a bill.

It is your bill. And as bills go, it has begun to take on a shabby, neglected look.

Like most people, I have had extremely tough sledding for the past few years. I had to pay my grocery bills, or get no more groceries. I had to pay the light bills, or they'd shut off the electricity. I had to pay the coal man or face an empty coal bin.

But I didn't have to pay yours—and so I put it off.

I imagine my case is not unique. For you doctors belong to a profession in which service to humanity comes before everything else. You made this evident in our case. When my wife was sick, your first thought was how to bring her back to health quickly. You stood by us through everything . . . giving without knowing when you would receive.

Now things are a little better with me. When they started to get better, both my wife and I agreed that one of the very first things we'd do, would be to pay your bill. Here is the check. And please believe me when I say that it was a genuine pleasure to write it.

With it goes my heartfelt gratitude for all you have done for us, and for the sporting way you carried us when bills were the bane of a harried existence.

Sincerely yours,

H_____ G_____

Many a doctor's bill has been gathering dust these past few years. Today, with the brightening economic skies, surely among the first obligations to be met are unpaid bills for medical services.

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